WHAT IS CLAIMED IS:

1. A vertical cavity surface emitting laser (VCSEL), comprising:

a vertical stack structure having a substantially planar top surface, including

a top mirror,

a bottom mirror,

a cavity region disposed between the top mirror and the bottom mirror and including an active light generation region,

at least one of the top mirror and the bottom mirror having a layer with a peripheral region oxidized into an electrical insulator as a result of exposure to an oxidizing agent;

wherein the vertical stack structure defines two or more etched holes each extending from the substantially planar top surface to the oxidized peripheral region, each of the etched holes being moisture passivated by an overlying moisture penetration barrier.

2. The VCSEL of claim 1, wherein the moisture penetration barrier has a thickness selected to prevent substantial vertical moisture intrusion into the etched holes.

3. The VCSEL of claim 2, wherein the moisture penetration barrier comprises a silicon nitride layer having a thickness of approximately 300 nm or greater.

4. The VCSEL of claim 3, wherein the moisture penetration barrier comprises a silicon nitride layer having a thickness of approximately 500 nm or greater.

5. The VCSEL of claim 1, wherein each of the etched holes is moisture passivated by an overlying moisture penetration barrier having a lateral surface area sufficient to prevent substantial delamination of the moisture penetration barrier.

6. The VCSEL of claim 1, wherein multiple etched holes are moisture passivated by a single continuous film of moisture penetration barrier material.

7. The VCSEL of claim 1, further comprising a top electrode disposed over the substantially planar top surface of the vertical stack structure and circumscribing a light emission region substantially free of any overlying moisture penetration barrier material.

8. The VCSEL of claim 7, wherein the moisture penetration barrier covers a major portion of the top surface of the vertical stack structure other than the top electrode and the light emission region.

9. The VCSEL of claim 1, wherein:

the moisture penetration barrier includes a peripheral edge intersecting the top surface of the vertical stack structure at a moisture penetration interface; and

at the top surface of the vertical stack structure each of the etched holes is circumscribed by a respective peripheral edge having a substantial portion separated from the moisture penetration interface by a distance sufficient to prevent substantial lateral moisture intrusion into the etched holes.

10. The VCSEL of claim 9, wherein a substantial portion of each of the etched hole peripheral edges is separated from the moisture penetration interface by a distance of approximately 15 μm or greater.

11. An array of two or more vertical cavity surface emitting lasers (VCSELs), each VCSEL comprising:

a vertical stack structure having a substantially planar top surface, including

a top mirror,

a bottom mirror,

a cavity region disposed between the top mirror and the bottom mirror and including an active light generation region,

at least one of the top mirror and the bottom mirror having a layer with a peripheral region oxidized into an electrical insulator as a result of exposure to an oxidizing agent;

wherein the vertical stack structure defines two or more etched holes each extending from the substantially planar top surface to the oxidized peripheral

region, each of the etched holes being moisture passivated by an overlying moisture penetration barrier.

12. A method of manufacturing a vertical cavity surface emitting laser (VCSEL), comprising:

forming a vertical stack structure having a substantially planar top surface, including

a top mirror,

a bottom mirror,

a cavity region disposed between the top mirror and the bottom mirror and including an active light generation region,

at least one of the top mirror and the bottom mirror having a layer with a peripheral region oxidized into an electrical insulator as a result of exposure to an oxidizing agent, wherein the vertical stack structure defines two or more etched holes each extending from the substantially planar top surface to the oxidized peripheral region; and

passivating each of the etched holes by an overlying moisture penetration barrier.

13. The method of claim 12, wherein the moisture penetration barrier has a thickness selected to prevent substantial vertical moisture intrusion into the etched holes.

14. The method of claim 13, wherein the moisture penetration barrier comprises a silicon nitride layer having a thickness of approximately 300 nm or greater.

15. The method of claim 14, wherein the moisture penetration barrier comprises a silicon nitride layer having a thickness of approximately 500 nm or greater.

16. The method of claim 12, wherein each of the etched holes is moisture passivated by an overlying moisture penetration barrier having a lateral

surface area sufficient to prevent substantial delamination of the moisture penetration barrier.

17. The method of claim 12, wherein multiple etched holes are moisture passivated by a single continuous film of moisture penetration barrier material.

18. The method of claim 12, further comprising disposing a top electrode over the substantially planar top surface of the vertical stack structure and circumscribing a light emission region substantially free of any overlying moisture penetration barrier material.

19. The method of claim 18, wherein the moisture penetration barrier covers a major portion of the top surface of the vertical stack structure other than top electrode and light emission regions.

20. The method of claim 12, wherein:

the moisture penetration barrier includes a peripheral edge intersecting the top surface of the vertical stack structure at a moisture penetration interface; and

at the top surface of the vertical stack structure each of the etched holes is circumscribed by a respective peripheral edge having a substantial portion separated from the moisture penetration interface by a distance sufficient to prevent substantial lateral moisture intrusion into the etched holes.